

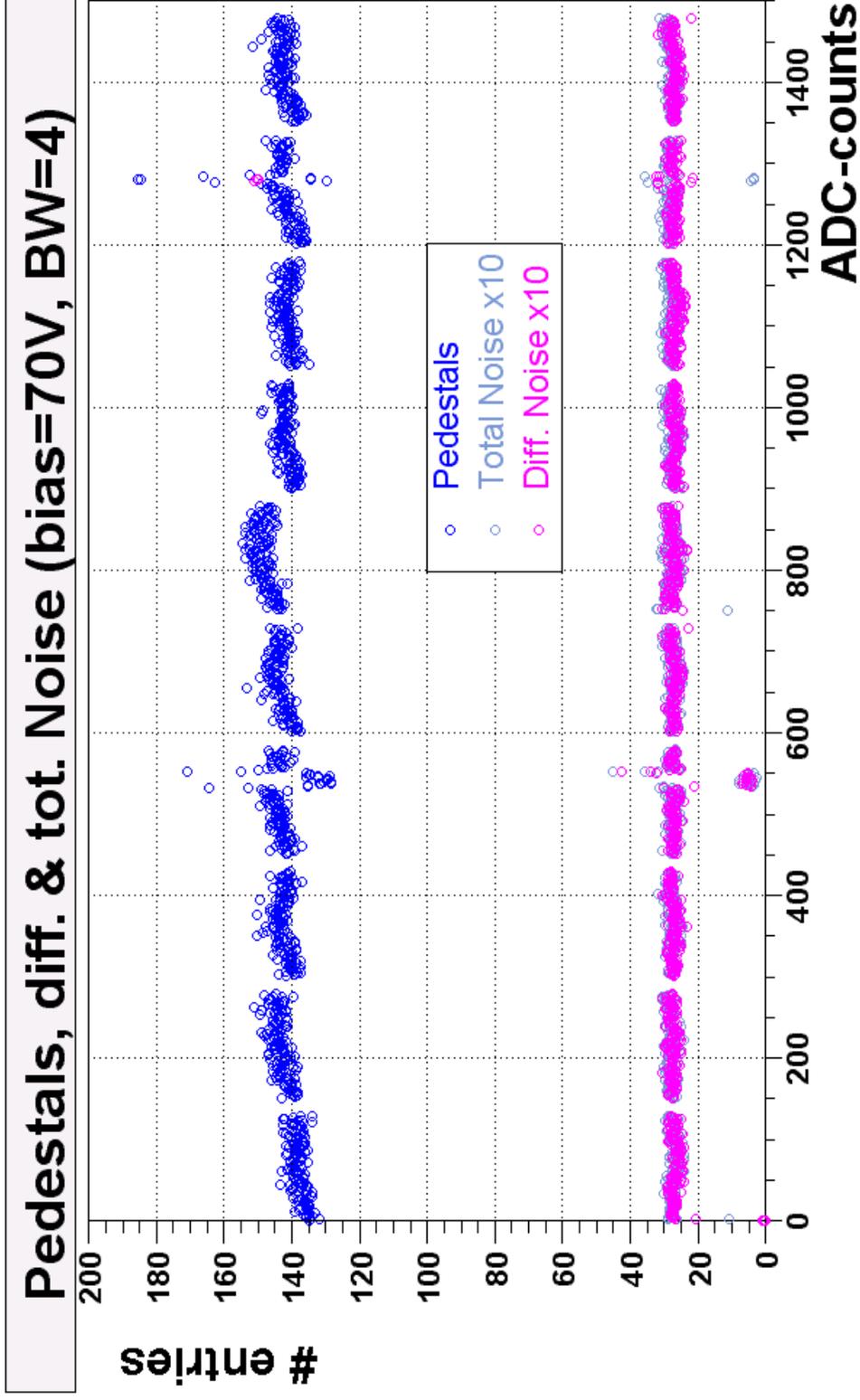
Irradiated Sensors - some measurements

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- Diff. noise versus BW for different module-temperatures:
 - ◆ @ $T_{\text{module}} = +20^{\circ}\text{C}$ for bias = 40V, 70V and 100V
 - ◆ @ $T_{\text{module}} = -20^{\circ}\text{C}$ only for bias = 70V so far
 - also tried to calculate the expected diff.noise from I_{leak}
but the formula gave weird results → investigating...
- Leakage current versus bias-voltage
 - ◆ @ $T_{\text{module}} = +20^{\circ}\text{C}$ for BW = 0
 - ◆ @ $T_{\text{module}} = -10^{\circ}\text{C}$ for BW = 0, 4 and 10
- Leakage current versus time (only measured once)

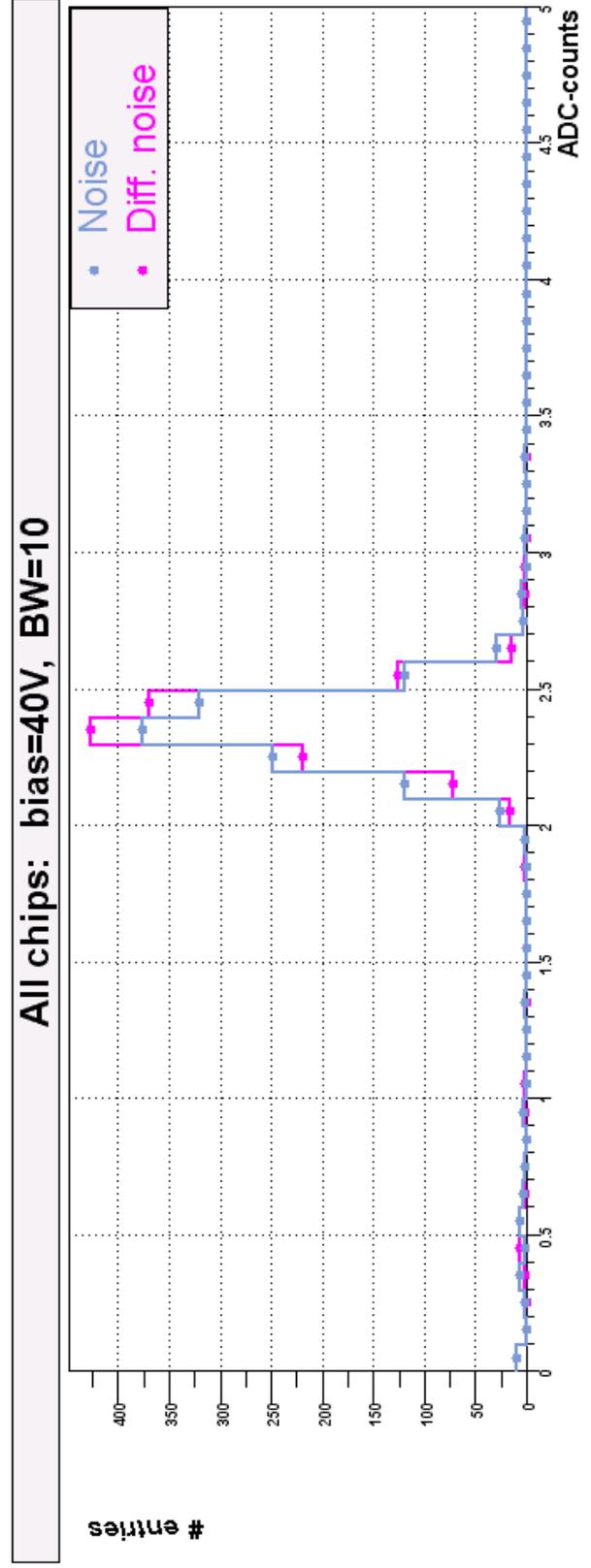
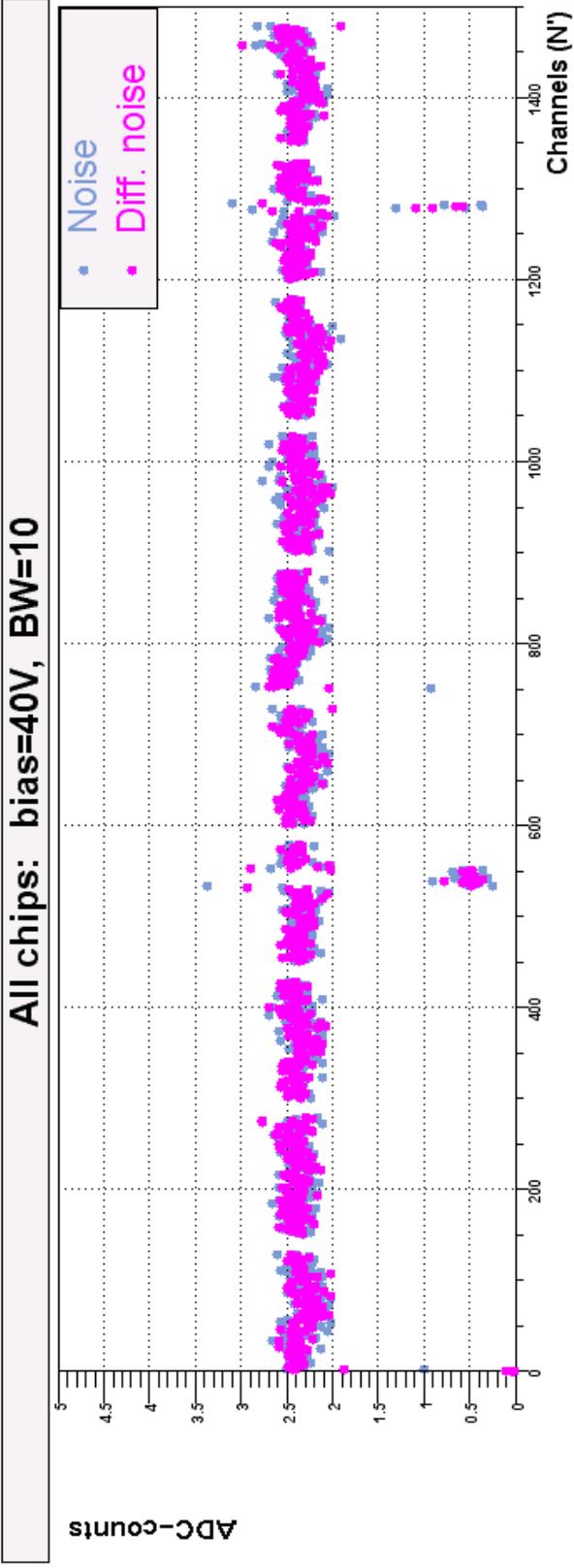


Pedestals, Diff.Noise and Total Noise



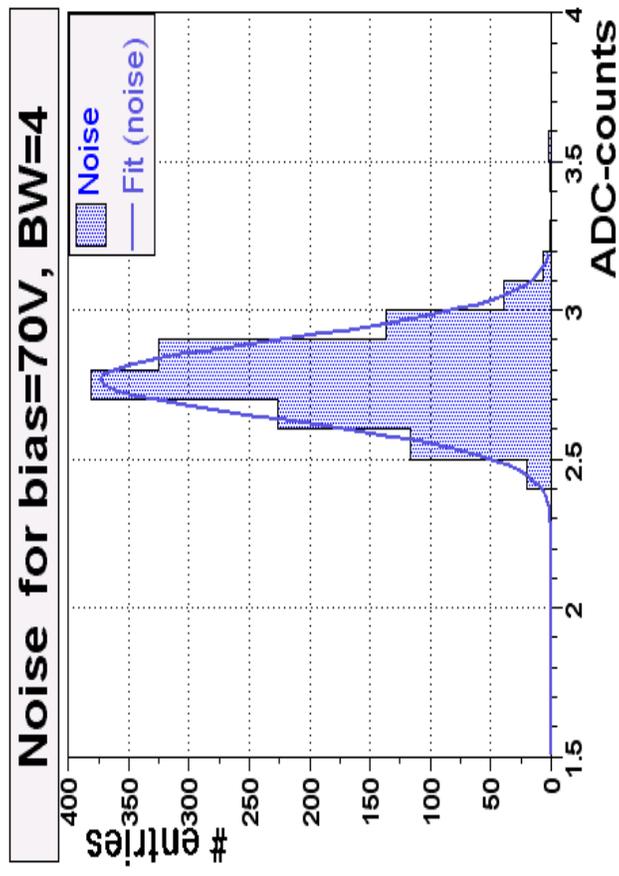
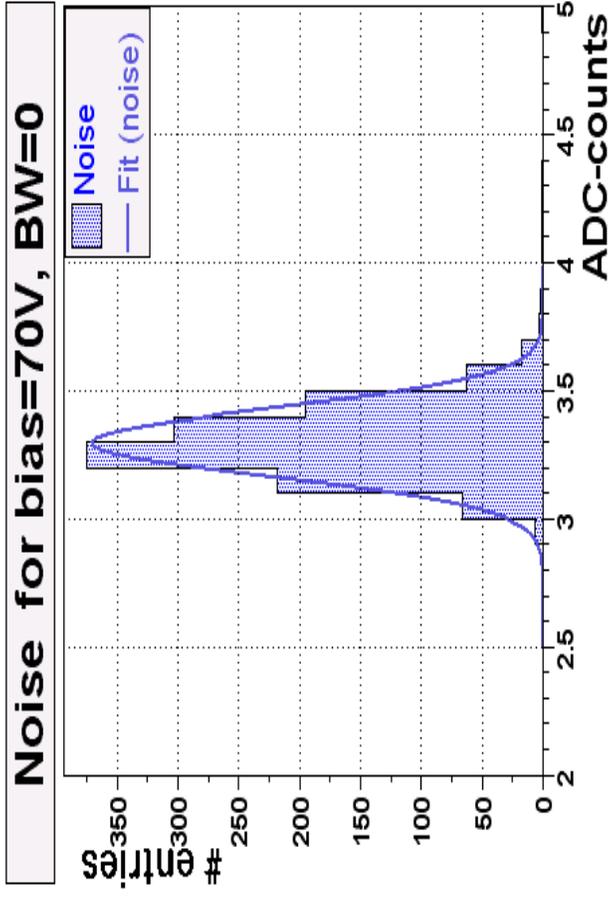
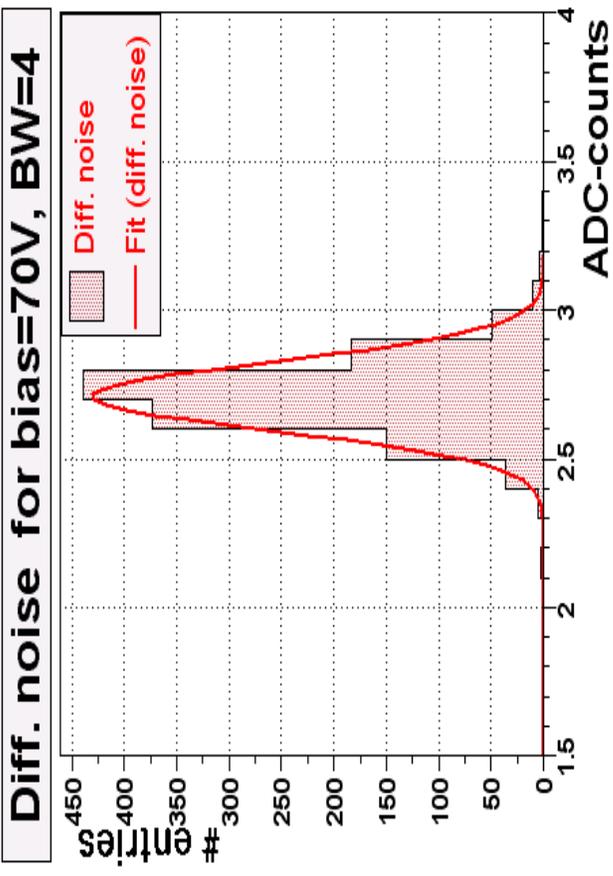
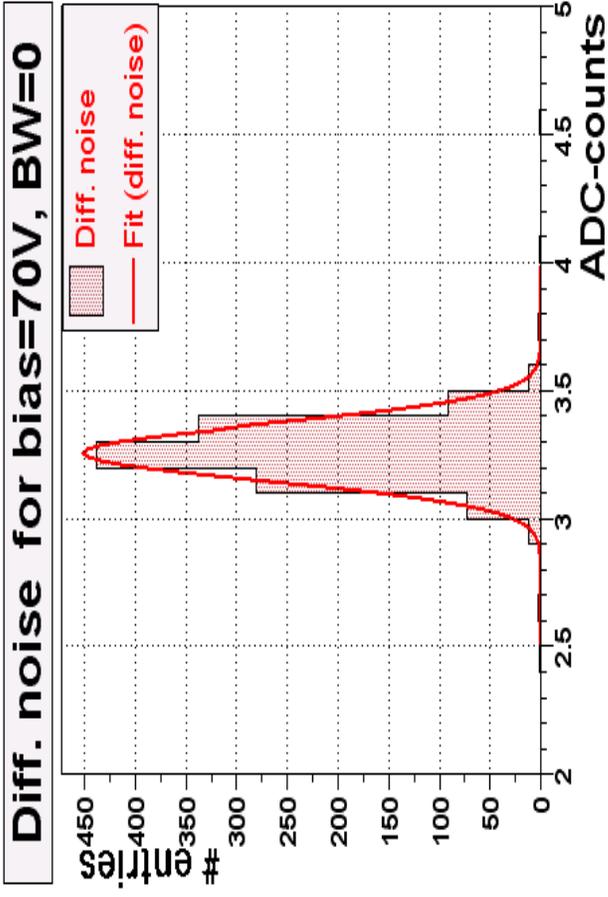


Diff. noise and total noise only



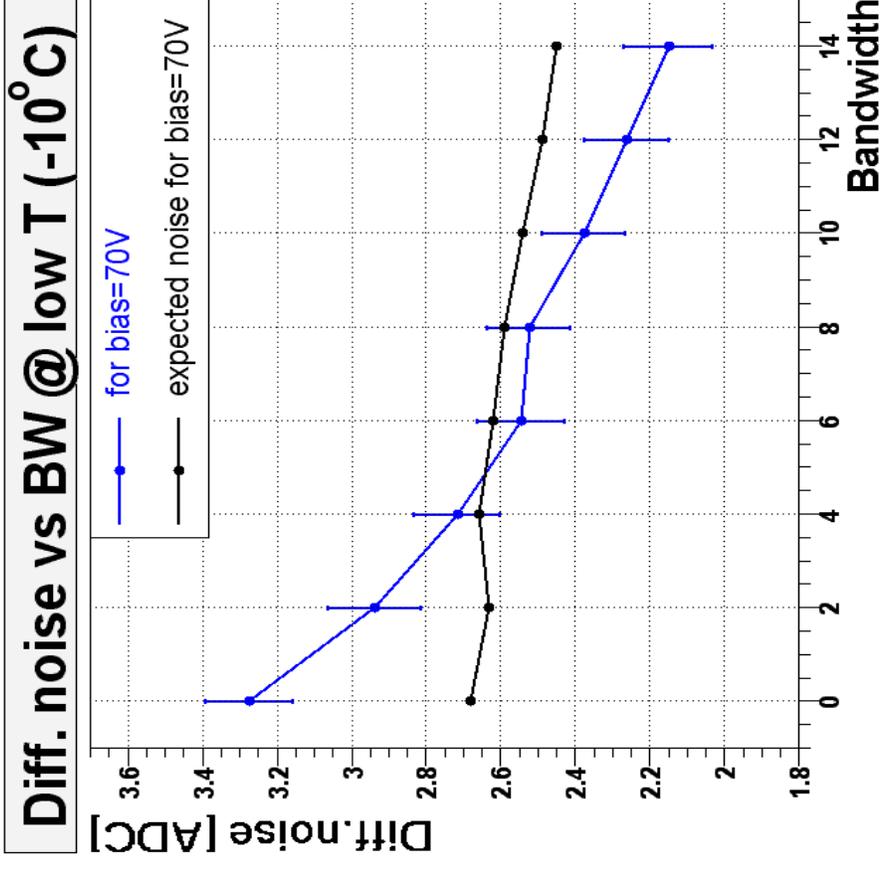
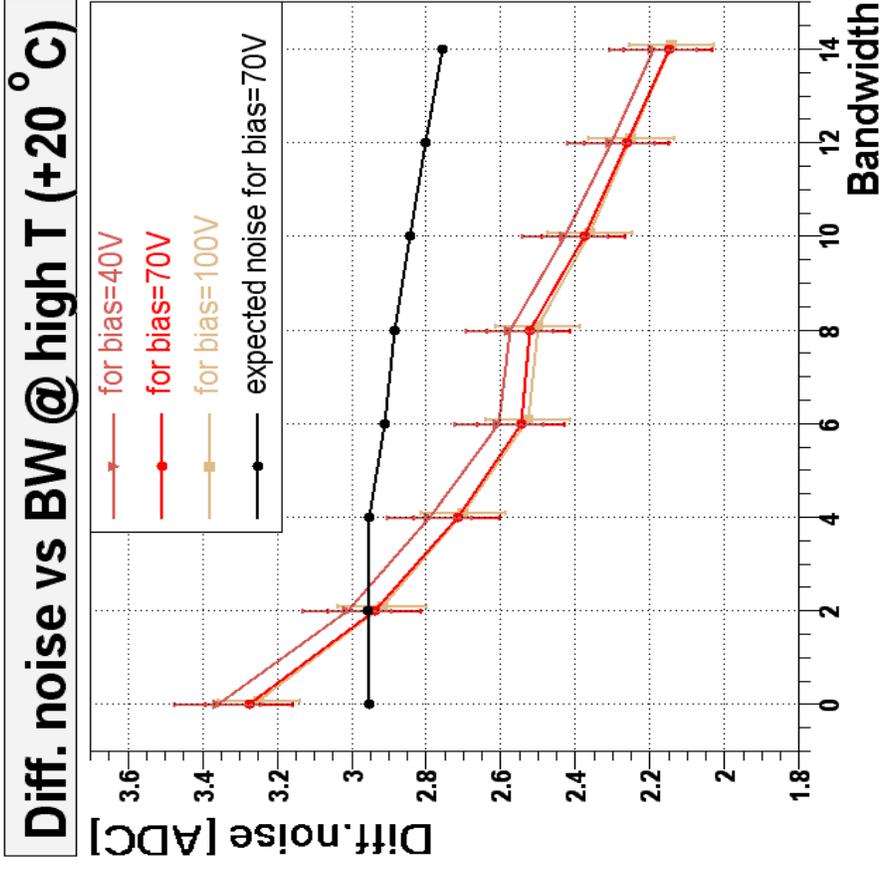


Diff.noise & total noise (fitted)





Shotnoise versus BW



The formula not only gives results way to high (e/ADC = 4800), but also a wrong overall behaviour... not sure why, yet.



SVX4-formula for shotnoise(?)

$$\text{noise}[e] = 76 \times \sqrt{I[\mu\text{A}]} \times \sqrt{T[\text{ns}] + \frac{\tau[\text{ns}]}{2}} (e^{-T/\tau} - e^{-2T/\tau} - 1)$$

with the risetime: $\tau[\text{ns}] = 25 + 5 \cdot \text{BW} [\text{ns}]$

and the integration time: $T = 132 \text{ ns}$

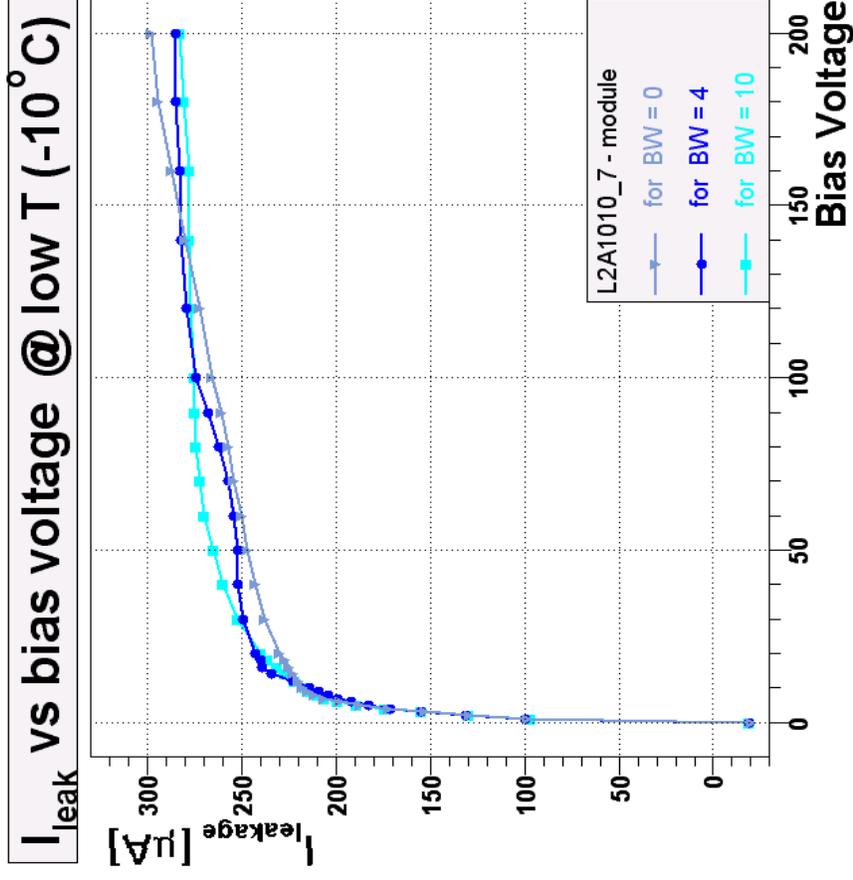
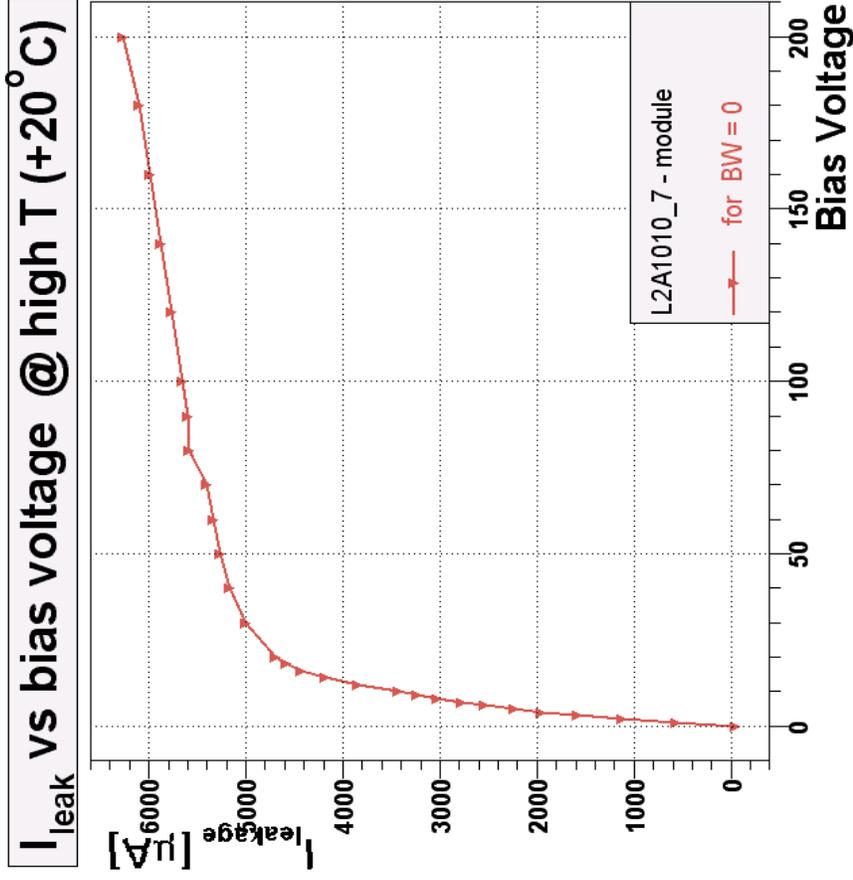
This formula should at least describe the shape of the measured curve, I_{leakage} vs bias-voltage, but it doesn't. The factor needed in order for the calculated curve being visible in the plots is much to big for being a reasonable one:

$e/\text{ADC} \approx 18000$ (@ $T = +20^\circ\text{C}$)

4200 (@ $T = -10^\circ\text{C}$)



I_{leakage} versus bias-voltage

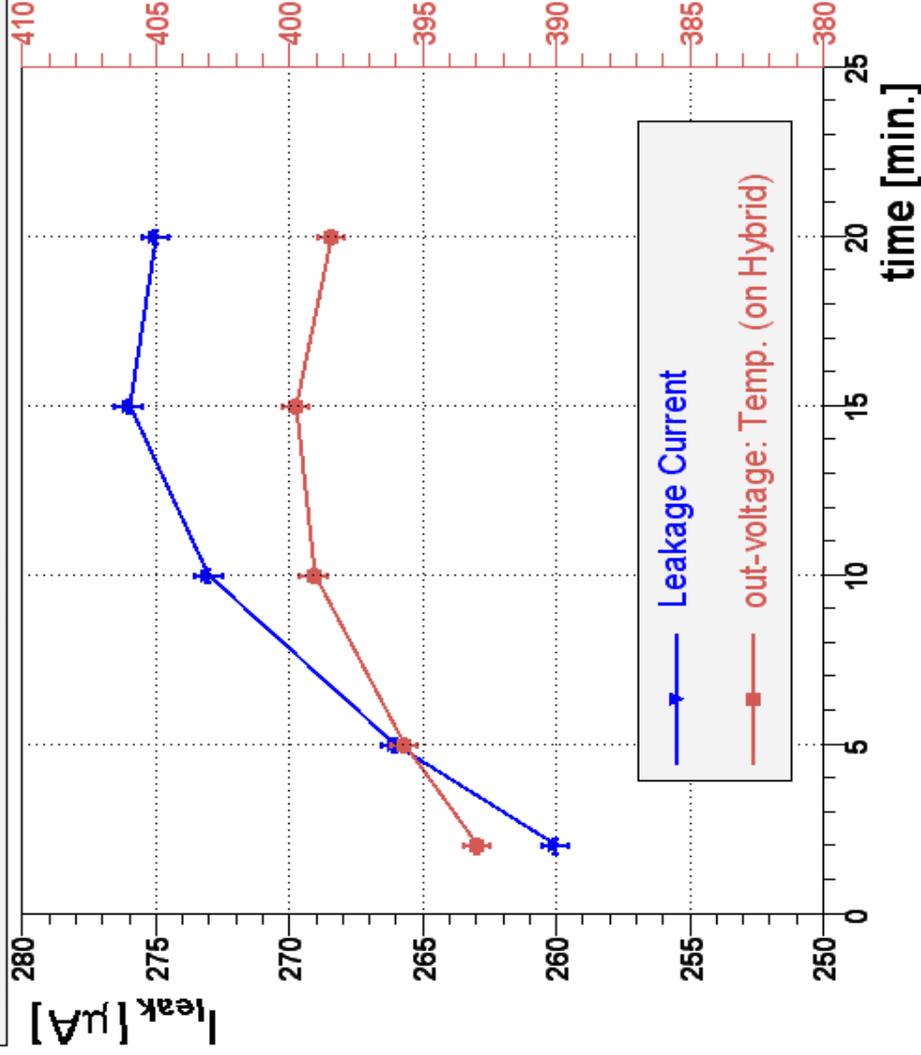


For BW = 0 the leakage current doesn't seem to saturate really, no matter how high the applied bias-voltage is.



I_{leakage} versus time

I_{leak} vs time (for: $T_{\text{mod.}} = -10^{\circ}\text{C}$, bias=70V, BW=4)



I_{leakage} depends not only on the temp. of the whole module (i.e. sensors), but also on the temp. of the hybrid itself. T_{hybrid} is the output-voltage on the hybrid.

Sofar not clear is the temp. distribution within the cooled module:

at $T_{\text{module}} = -10^{\circ}\text{C}$, a temp.

of $T_{\text{hybrid}} = +4\text{-}5^{\circ}\text{C}$ was seen.



What else...?

- also measured L0_4 module @ $T_{\text{module}} = -10^{\circ}\text{C}$, but the data is still on a local disk...
- still need to measure I_{leakage} vs bias voltage for BW=4 and BW=10 @ $T_{\text{module}} = +20^{\circ}\text{C}$ for the irradiated L2A1010_7 module
- calculate correct expected noise-curve from I_{leakage}
- measurements @ $T_{\text{module}} = +20^{\circ}\text{C}$ for L0_4 module
- move on to new modules...